

AMENDMENTS TO THE CLAIMS:

Claim 1. (Currently amended) An electric power steering apparatus adapted to transmit power supplied from an electric motor for assisting steering, the electric power steering apparatus comprising:

a driving gear and a driven gear through which the power is transmitted,

wherein a first backlash between the driving gear and the driven gear in a first range of steering angles including is set at least in a neighborhood region of a steering neutral position is to be smaller than a second backlash in a second range of steering angles that in a remaining region, and

wherein at least one of said driven gear and said driving gear comprises a bias portion that sets said first backlash, and

wherein said driven gear includes said bias portion formed by biasing a part of an outer periphery of teeth in a direction in which the first backlash is decreased.

Claim 2. (Canceled).

Claim 3. (Previously presented) The electric power steering apparatus according to claim 1, wherein the driving gear comprises a worm, the driven gear comprises a worm wheel, and a shaft center of the worm is offset in an axial direction of the worm wheel by a predetermined offset amount.

Claim 4. (Currently amended) The apparatus of claim 1, wherein said first range of steering angles neighborhood region comprises a steering angular range on each side of said

steering neutral position.

Claim 5. (Currently amended) The apparatus of claim 4, wherein said first range of steering angles ~~steering angular range~~ comprises a substantially equal steering angle range on each side of said steering neutral position.

Claim 6. (Currently amended) The apparatus of claim 5, wherein said first range of steering angles ~~steering angle~~ comprises about twenty degrees of steering angle.

Claim 7. (Currently amended) The apparatus of claim 4, wherein said second range of steering angles ~~remaining region~~ comprises a range of steering angles ~~angle~~ that exceeds said first range of steering angles ~~angular range~~.

Claim 8. (Currently amended) An electric power steering apparatus adapted to transmit power supplied from an electric motor for assisting steering, the electric power steering apparatus comprising:

a driving gear and a driven gear through which the power is transmitted,

wherein a first backlash between the driving gear and the driven gear in a first range of steering angles including ~~is set at least in a neighborhood region of~~ a steering neutral position is to be smaller than a second backlash in a second range of steering angles ~~that in a remaining region~~,

wherein at least one of said driven gear and said driving gear comprises a bias portion that sets said first backlash, and

wherein:

ΔRA corresponds to an amount of change in a gearing angle RA per arc-minute of backlash between said driving gear and said driven gear;

α corresponds to a pressure angle between said driven gear and said driving gear;

D corresponds to a pitch circle diameter of one of said driving gear and said driven gear; and

$$\Delta RA = (\pi \times D) / (360 \times 60 \times 2 \times \tan(\alpha)).$$

Claim 9. (Previously presented) The apparatus of claim 8, wherein when the pitch circle diameter ranges from about 80 millimeters to about 100 millimeters and wherein the amount of change in gearing angle RA per arc-minute of backlash ΔRA comprises a range of about 22 micrometers to about 28 micrometers.

Claim 10. (Currently amended) The apparatus of claim 1, wherein said backlash changes gradually between said first range of steering angles and said second range of steering angles ~~neighborhood region of operation and said remaining region of operation.~~

Claim 11. (Canceled).

Claim 12. (Currently amended) An electric power steering apparatus adapted to transmit power supplied from an electric motor for assisting steering, the electric power steering apparatus comprising:

a driving gear and a driven gear through which the power is transmitted,

wherein a first backlash between the driving gear and the driven gear in a first range of steering angles including is set at least in a neighborhood region of a steering neutral position is to be smaller than a second backlash in a second range of steering angles that in a remaining region, and

wherein at least one of said driven gear and said driving gear comprises a bias portion that sets said first backlash, and

wherein said bias portion is provided on an outer peripheral portion of the teeth of said at least one of said driving gear and said driven gear.

Claim 13. (Currently amended) The apparatus of claim 1, wherein at least one of said driving gear and said driven gear comprises a first radius of a pitch circle corresponding to said first range of steering angles neighborhood region that is larger than a second radius of a pitch circle corresponding to said second range of steering angles remaining region.

Claim 14. (Previously presented) The apparatus of claim 13, wherein the at least one of said driving gear and said driven gear comprises a gearing radius that is smaller than said first radius.

Claim 15. (Previously presented) The apparatus of claim 13, wherein the at least one of said driving gear and said driven gear comprises a gearing radius that is larger than said second radius.

Claim 16. (Canceled).

Claim 17. (Currently amended) The apparatus of claim 20, wherein the first range of steering angles includes operation ~~corresponds to~~ a neutral position for a steering wheel of a vehicle comprising the power steering apparatus.

Claim 18 (Previously presented) The apparatus of claim 17, wherein the neutral position corresponds to a straight traveling condition for said vehicle.

Claim 19. (Canceled).

Claim 20. (Currently amended) A power steering apparatus comprising:

a driving gear; and

a driven gear engaging the driving gear such that a first backlash between the driving gear and the driven gear is smaller in a first range of steering angles operation than a second backlash in a second range of steering angles operation,

wherein at least one of said driven gear and said driving gear comprises a bias portion that corresponds to said first range of steering angles operation, and

wherein said bias portion is provided on an outer peripheral portion of the teeth on said at least one of said driving gear and said driven gear.

Claim 21. (Previously presented) The apparatus of claim 20, wherein one of said driving gear and said driven gear comprises a worm gear and the other of said driving gear and said driven gear comprises a worm wheel engaging said worm gear.

Claim 22. (Previously presented) The apparatus of claim 21, wherein a shaft center of said worm is offset in an axial direction relative to said worm wheel by a predetermined offset amount.

Claim 23. (Currently amended) The apparatus of claim 20, wherein at least one of said driving gear and said driven gear comprises a first radius of a pitch circle corresponding to said first range of steering angles ~~operation~~ that is larger than a second radius of a pitch circle corresponding to said second range of steering angles ~~operation~~.

Claim 24. (Previously presented) The apparatus of claim 23, wherein the at least one of said driving gear and said driven gear comprises a gearing radius that is smaller than said first radius.

Claim 25. (Previously presented) The apparatus of claim 23, wherein the at least one of said driving gear and said driven gear comprises a gearing radius that is larger than said second radius.

Claim 26. (Currently amended) The apparatus of claim 20, wherein the first range of steering angles ~~comprises operation corresponds to a steering angular range about~~ a neutral steering position.

Claim 27. (Currently amended) The apparatus of claim 26, wherein said first range of steering angles ~~angular range~~ comprises a substantially equal steering angle on each side of

said neutral steering position.

Claim 28. (Currently amended) The apparatus of claim 26, wherein said first range of steering angles ~~angular range~~ comprises about twenty degrees of steering angle.

Claim 29. (Currently amended) A power steering apparatus comprising:

a driving gear; and

a driven gear engaging the driving gear such that a first backlash between the driving gear and the driven gear is smaller in a first range of steering angles operation than a second backlash in a second range of steering angles operation,

wherein at least one of said driven gear and said driving gear comprises a bias portion that corresponds to said first range of steering angles operation, and wherein:

ΔRA corresponds to an amount of change in a gearing angle RA per arc-minute of backlash between said driving gear and said driven gear;

α corresponds to a pressure angle between said driven gear and said driving gear;

D corresponds to a pitch circle diameter of one of said driving gear and said driven gear; and

$$\Delta RA = (\pi \times D) / (360 \times 60 \times 2 \times \tan(\alpha)).$$

Claim 30. (Previously presented) The apparatus of claim 29, wherein when the pitch circle diameter ranges from about 80 millimeters to about 100 millimeters and wherein the amount of change in said gearing angle RA per arc-minute of backlash ΔRA comprises a range of about 22 micrometers to about 28 micrometers.

Claim 31. (Currently amended) The apparatus of claim 20, wherein said first backlash changes gradually between said first range of steering angles to said second backlash in said second range of steering angles ~~region of operation~~ and said ~~second region of operation~~.

Claim 32. (Currently amended) The apparatus of claim 20, further comprising a motor for providing a steering assistance torque to said driving gear and wherein said first range of steering angles ~~region of operation~~ corresponds to a range of steering angles ~~region of operation~~ where said drive motor provides a smaller steering assistance torque than said second range of steering angles ~~region of operation~~.